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MCKENNA LONG & ALDRIDGE LLP
1900 K STREET, NW
WASHINGTON, DC 20006

EXAMINER	
SHERMAN, STEPHEN G	
ART UNIT	**PAPER NUMBER**
2674	

DATE MAILED: 12/14/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/606,752	HAM ET AL.	
	Examiner	Art Unit	
	Stephen G. Sherman	2674	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *14 November 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-23* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *14 November 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.

4)☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.

5)☐ Notice of Informal Patent Application (PTO-152)

6)☐ Other: _____.

DETAILED ACTION

1. This office action is in response to the amendment filed 14 November 2005. Claims 1-23 are pending.

Response to Arguments

2. Applicant's arguments with respect to claims 1, 7, 11and 18 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.

4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

5. Claims 1-6 and 11-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over the applicants' APA (Specification paragraphs [0003]-[0018] and Figures 1-4), in view of Morita (US 2002/0196221) and further in view of Lee (US 2001/0038372).

Regarding claim 1, APA discloses a method for driving a liquid crystal display, comprising the steps of:

receiving source data (Figure 4, Data in);

comparing source data of a previous frame with the source data of a current frame to select a preset modulated data in accordance with the result of the comparison (Figure 4, Fn and F_{n-1} and page 5, paragraph [0010], 2nd sentence); and

modulating the source data by using the selected modulated data (Figure 4, Mdata Out).

The APA fails to teach of reducing the number of bits of the source data, thereby generating a reduced-bit source data. Morita teaches of reducing the number of bits of the source data, thereby generating a reduced-bit source data (Page 2, paragraph [0022]).

Therefore it would have been obvious to "one of ordinary skill" in the art at the time the invention was made to combine the teachings of APA and Morita in order to create a liquid crystal display driving method that would not cause deterioration in picture quality but would also reduce the memory of the lookup table.

APA and Morita fail to teach of a method for driving a liquid crystal display wherein a bit number of a reduced-bit source data of a previous frame is the same as that of a current frame, and a bit number of the preset modulated data is more than that of the reduced-bit source data of each previous frame and current frame.

Lee discloses a method for driving a liquid crystal display wherein a bit number of a reduced-bit source data of a previous frame is the same as that of a current frame, and a bit number of the preset modulated data is more than that of the reduced-bit source data of each previous frame and current frame (Figure 11 and paragraphs [0096]-[0102]. The bit numbers of the previous and present frames are both equal to 6-bits. The examiner interprets that the modified 8-bit signal which is outputted is the preset modulated data, which is more than the bit number of the reduced-bit previous and current frames. The 8-bit value is preset because prior to the comparing of the previous and current frames 6-bit numbers, the 2-bits which are supplied to the data gray scale signal converter 480 are already known or *preset*. Then, the 6-bit values of the present and previous frames are compared and modified to a 6-bit value that was also preset in the data gray signal converter 480. Since the preset 6-bit modified value is then added to the known 2-bit value to create an 8-bit signal, the preset data bit number is greater than the bit number of the reduced frames.).

Therefore it would have been obvious to "one of ordinary skill" in the art at the time the invention was made to use the method taught by Lee with the method taught by the combination of APA and Morita in order to enhance the response speed of the

liquid crystal by modifying the liquid crystal driving method without modifying the structure of the TFT-LCD.

Regarding claim 2, APA, Morita and Lee disclose the method of claim 1. Morita also discloses wherein the selected modulated data is set to be a minimum value within a data band that includes a plurality of initial modulated data, wherein each of the initial modulated data is larger than a current data value of the current frame, when the current data value of the current frame is larger than a previous data value of a previous frame (Page 2, paragraph [0031]. The examiner interprets the lookup table of consisting of initial modulated data and that a value larger than the current data value (first input data) could be chosen from this table when the current data is larger than the previous data (second input data) and that in selecting this data, since overshooting is being performed, that it would be logical for the value in the data band that would be selected would be the minimum value because all of the values are larger than that of the current value and the next highest number would be the minimum.). Therefore it would have been obvious to "one of ordinary skill" in the art at the time the invention was made to combine the teachings of APA, Morita and Lee in order to allow for the optimization of display characteristics.

Regarding claim 3, APA, Morita and Lee disclose the method of claim 1. Morita also discloses wherein the selected modulated data is set to be a maximum value within a data band that includes a plurality of initial modulated data, wherein each of the initial

modulated data is smaller than a current data value of the current frame, when the current data value of the current frame is smaller than a previous data value of a previous frame (Page 2, paragraph [0031]. The examiner interprets the lookup table of consisting of initial modulated data and that a value smaller than the current data value (first input data) could be chosen from this table when the current data is smaller than the previous data (second input data) and that in selecting this data, since overshooting is being performed, that it would be logical for the value in the data band that would be selected would be the maximum value because all of the values are smaller than that of the current value and the next lowest number would be the maximum.). Therefore it would have been obvious to "one of ordinary skill" in the art at the time the invention was made to combine the teachings of APA, Morita and Lee in order to allow for the optimization of display characteristics.

Regarding claim 4, APA, Morita and Lee disclose the method of claim 1. Morita also discloses wherein the source data is modulated to a current data value of the current frame, in modulating the source data, when the current data value of a current frame is the same as a previous data value of the previous frame (Page 1, paragraph [0012] where it states: "That is, the lookup table 103 is set a value, in advance, so that, when a gray-scale value of an input 1 is equal to a gray-scale of an input 2, the gray-scale value is output as an output 2..." The examiner interprets input 1 and 2 to be the current and previous frame data and that when these values are equal the lookup table is bypassed.). Therefore it would have been obvious to "one of ordinary skill" in the art

at the time the invention was made to combine the teachings of APA, Morita and Lee in order to allow the display to maintain the current settings when no change has been detected within the system.

Regarding claim 5, APA, Morita and Lee disclose the method of claim 1. Morita also discloses the method of claim 1 further comprising delaying the reduced-bit source data by one frame interval (Page 2, paragraph [0023]). Therefore it would have been obvious to "one of ordinary skill" in the art at the time the invention was made to combine the teachings of APA, Morita and Lee in order to allow for the comparison between the current and previous frame value.

Regarding claim 6, APA, Morita and Lee disclose the method of claim 5. APA, Morita and Lee fail to disclose wherein the source data is an 8-bît data, and the reduced-bit source data is a 7-bit data. However, it would have been obvious to "one of ordinary skill" in the art at the time the invention was made to make the source data 8 bits and the reduced source data 7 bits in order to save memory space by allowing for a smaller lookup table.

Regarding claim 11, APA discloses an apparatus for driving a liquid crystal display, comprising:

an input line for receiving source data (Figure 4, Data in); and

a modulator for comparing the source data of a current frame with the source data of a previous frame to modulate the source data by using a preset modulated data in accordance with a result of the comparison (Figure 4, Fn and F_{n-1} and page 5, paragraph [0010], 2nd sentence).

APA fails to teach of a bit converter for reducing the number of bits of the received source data to generate reduced bit source data.

Morita discloses a bit converter for reducing the number of bits of the received source data to generate reduced bit source data (Page 2, paragraph [0023]).

Therefore it would have been obvious to "one of ordinary skill" in the art to combine the teachings of APA and Morita in order to create a liquid crystal display driving apparatus that would not cause deterioration in picture quality but would also reduce the memory of the lookup table.

APA and Morita fail to teach of a method for driving a liquid crystal display wherein a bit number of a reduced-bit source data of a previous frame is the same as that of a current frame, and a bit number of the preset modulated data is more than that of the reduced-bit source data of each previous frame and current frame.

Lee discloses a method for driving a liquid crystal display wherein a bit number of a reduced-bit source data of a previous frame is the same as that of a current frame, and a bit number of the preset modulated data is more than that of the reduced-bit source data of each previous frame and current frame (Figure 11 and paragraphs [0096]-[0102]. The bit numbers of the previous and present frames are both equal to 6-bits. The examiner interprets that the modified 8-bit signal which is outputted is the

preset modulated data, which is more than the bit number of the reduced-bit previous and current frames. The 8-bit value is preset because prior to the comparing of the previous and current frames 6-bit numbers, the 2-bits which are supplied to the data gray scale signal converter 480 are already known or *preset*. Then, the 6-bit values of the present and previous frames are compared and modified to a 6-bit value that was also preset in the data gray signal converter 480. Since the preset 6-bit modified value is then added to the known 2-bit value to create an 8-bit signal, the preset data bit number is greater than the bit number of the reduced frames.).

Therefore it would have been obvious to "one of ordinary skill" in the art at the time the invention was made to use the method taught by Lee with the method taught by the combination of APA and Morita in order to enhance the response speed of the liquid crystal by modifying the liquid crystal driving method without modifying the structure of the TFT-LCD.

Regarding claim 12, APA, Morita and Lee disclose the apparatus of claim 11. Morita also discloses wherein the selected modulated data is set to be a minimum value within a data band that includes a plurality of initial modulated data, and each of the initial modulated data is larger than a current data value of the current frame, when the current data value of the current frame is larger than a previous data value of the previous frame (Page 2, paragraph [0031]. The examiner interprets the lookup table of consisting of initial modulated data and that a value larger than the current data value (first input data) could be chosen from this table when the current data is larger than the

previous data (second input data) and that in selecting this data, since overshooting is being performed, that it would be logical for the value in the data band that would be selected would be the minimum value because all of the values are larger than that of the current value and the next highest number would be the minimum.).

Therefore it would have been obvious to "one of ordinary skill" in the art at the time the invention was made to combine the teachings of APA, Morita and Lee in order to allow for the optimization of display characteristics.

Regarding claim 13, APA, Morita and Lee disclose the apparatus of claim 11. Morita also discloses wherein the selected modulated data is set to be a maximum value within a data band that includes a plurality of initial modulated data, and each of the initial modulated data is smaller than a current data value of the current frame, when the current data value of the current frame is smaller than a previous data value of the previous frame (Page 2, paragraph [0031]. The examiner interprets the lookup table of consisting of initial modulated data and that a value smaller than the current data value (first input data) could be chosen from this table when the current data is smaller than the previous data (second input data) and that in selecting this data, since overshooting is being performed, that it would be logical for the value in the data band that would be selected would be the maximum value because all of the values are smaller than that of the current value and the next lowest number would be the maximum.).

Therefore it would have been obvious to "one of ordinary skill" in the art at the time the invention was made to combine the teachings of APA, Morita and Lee in order to allow for the optimization of display characteristics.

Regarding claim 14, APA, Morita and Lee disclose the apparatus of claim 11. Morita also discloses wherein the source data is modulated to the current data value of the current frame, when the current data value of the current frame is the same as a previous data value of the previous frame (Page 1, paragraph [0012] where it states: "That is, the lookup table 103 is set a value, in advance, so that, when a gray-scale value of an input 1 is equal to a gray-scale of an input 2, the gray-scale value is output as an output 2..." The examiner interprets input 1 and 2 to be the current and previous frame data and that when these values are equal the lookup table is bypassed.).

Therefore it would have been obvious to "one of ordinary skill" in the art at the time the invention was made to combine the teachings of APA, Morita and Lee in order to allow the display to maintain the current settings when no change has been detected within the system.

Regarding claim 15, APA, Morita and Lee disclose the apparatus of claim 11. Morita also disclose wherein the modulator includes: a frame memory for delaying the reduced-bit source data for one frame interval (Figure 1, item 3 and page 2, paragraph [0023]); and a lookup table for comparing the reduced-bit source data of the previous frame with the reduced-bit source data of the current frame to select a preset modulated

data in accordance with the result of the comparison (Figure 1, item 4 and page 2, paragraph [0024].

Therefore it would have been obvious to "one of ordinary skill" in the art at the time the invention was made to combine the teachings of APA, Morita and Lee in order to allow for a driving apparatus that could compare a previous and current frame and make an adjustment accordingly.

Regarding claim 16, APA, Morita and Lee disclose the apparatus for driving according to claim 15. Morita also discloses wherein the bit converter is connected between the frame memory and an input terminal of the lookup table (Figure 1, items 1, 3 and 4 where items 1 and 2 make up the bit converter in which item 2 is connected to item 3, the frame memory, and item 2 is also connected to an input terminal of item 4, the lookup table. Since the controller, item 2, is in combination with item 1 to make the bit converter, the bit converter is therefore between items 3 an 4, the frame memory and lookup table.).

Therefore it would have been obvious to "one of ordinary skill" in the art at the time the invention was made to combine the teachings of APA, Morita and Lee in order to allow for the source data to be reduced before it is stored in memory so that it will take up less memory space.

Regarding claim 17, APA, Morita and Lee disclose the apparatus for driving according to claim 11. APA, Morita and Lee fail to disclose wherein the source data is

an 8-bît data, and the reduced-bit source data is a 7-bit data. However, it would have been obvious to "one of ordinary skill" in the art at the time the invention was made to make the source data 8 bits and the reduced source data 7 bits in order to save memory space by allowing for a smaller lookup table.

6. Claims 7-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over the applicants' APA (Specification paragraphs [0003]-[0018] and Figures 1-4), in view of Morita (US 2002/0196221) and further in view of Lee (US 2001/0038372) and Miyata et al. (US 6,853,384).

Regarding claim 7, APA discloses a method for driving a liquid crystal display, comprising: the first and second data being the current and previous frame data values (Page 5, paragraph [0010]).

APA fails to teach a method for driving a liquid crystal display, comprising: setting a first modulated data that has a larger value than a data value in accordance with an increase of the data value; setting a second modulated data that has a smaller value than the data value in accordance with a decrease of the data value; and supplying the n bit source data of a first data to a liquid crystal display panel or modulating the source data by using the first and second modulated data in accordance with a result of the judging step.

Morita discloses a method for driving a liquid crystal display, comprising:

setting a first modulated data that has a larger value than a data value in accordance with an increase of the data value (Page 2, paragraph [0031]. The examiner interprets that the value chosen by the lookup table that is larger than the data value would be a first modulated value.);

setting a second modulated data that has a smaller value than the data value in accordance with a decrease of the data value (Page 2, paragraph [0031]. The examiner interprets that the value chosen by the lookup table that is smaller than the data value would be a second modulated data.);

supplying the source data of a first data to a liquid crystal display panel or modulating the source data by using the first and second modulated data in accordance with a result of the judging step (Page 2, paragraph [0024]. The examiner interprets the lookup table as being the judging step which supplies the source data or modulating data based on whether the values are smaller, larger or equal as stated in paragraph [0031] on page 2.).

Therefore it would have been obvious to "one of ordinary skill" in the art at the time the invention was made to combine the teachings of APA and Morita in order to create a driving method that could determine whether a value has changed and whether an increase or decrease of that value should be made appropriately such that the picture quality will be improved.

APA and Morita fail to teach a method for driving a liquid crystal display comprising of the first and second modulated data being n-bit, determining whether an n-k bit source data of the current frame is identical to an n-k bit source data of the

previous frame stored in memory, and modulating an n-k bit source data by using the first and second n-bit modulated data in accordance with a result of the judging step.

Lee discloses a method for driving a liquid crystal display comprising of setting modulated data to be n-bit, determining whether an n-k bit source data of a first data is identical to an n-k bit source data of a second data stored in the storage memory; wherein k is a positive integer less than n, and modulating an n-k bit source data by using the n-bit modulated data (Figure 11 and paragraphs [0096]-[0102]. The examiner interprets the 6-bit gray signals to be the n-k bit source data and that since the modified gray signals are generated by considering the present and previous frames, that this would consider them if they were identical, and setting modulated data to be n-bit would consist of the adding of the 2-bit data and the generated 6-bit values to make the 8-bit output value, and that the 6-bit values are modulated and that the modulation is accomplished ultimately using the 8-bit generated data.).

Therefore it would have been obvious to "one of ordinary skill" in the art at the time the invention was made to use the method of using modulated data of the same bit number as the source data as taught by Lee with the driving method of using either modified or the original source data taught by the combination of APA and Morita in order to enhance the response speed of the liquid crystal by modifying the liquid crystal driving method without modifying the structure of the TFT-LCD.

APA, Morita and Lee fail to teach of storing in a storage memory an n-bit source data, wherein n is a positive integer.

Miyata et al. discloses of storing in a storage memory an n-bit source data, wherein n is a positive integer (Figure 1, item 34).

Therefore it would have been obvious to "one of ordinary skill" in the art at the time the invention was made to incorporate the storage device taught by Miyata et al. with the driving method taught by the combination of APA, Morita and Lee in order to improve image quality of displayed moving images by improving an apparent response speed of liquid crystal molecules by way of suppressing a mismatch by reducing a voltage change of pixel electrodes associated with a change of liquid crystal display elements.

Regarding claim 8, APA, Morita, Lee and Miyata et al. disclose the method of claim 7. Morita also discloses wherein n is 8 and k is 1 (Page 2, paragraph [0027]. The examiner interprets this to mean that since the first input is made up of 8 bits such that n=8 and k=1.). Therefore it would have been obvious to "one of ordinary skill" in the art at the time the invention was made to combine the teachings of APA, Morita, Lee and Miyata et al. in order to provide a source data that consists of 8 bits.

Regarding claim 9, APA, Morita, Lee and Miyata et al. disclose the method of claim 7. Morita also discloses wherein the supplying the source data includes: supplying the n-bit source data of the current frame to the liquid crystal display panel, when the source data value of the current frame is identical to the source data value of the previous frame (Page 1, paragraph [0012] where it states: "That is, the lookup table

103 is set a value, in advance, so that, when a gray-scale value of an input 1 is equal to a gray-scale of an input 2, the gray-scale value is output as an output 2..."); and comparing bits from the source data of the current frame with corresponding bits from the previous frame wherein k is a positive integer less than n, to modulate the source data by using the first and second modulated data, when the n-bit source data value of the current frame differs from the n-bit source data value of the previous frame (Page 1, paragraph [0012] where it states: "...however, when a gray-scale value of the input 2 is smaller than a grayscale of the input 1, an output 2 having a gray-scale value being larger than a gray-scale value of an input 2 is output as an overshooting gray-scale value and, when a gray-scale value of an input 2 is larger than a gray-scale value of an input 1, and output 2 having a gray-scale value being smaller than a gray-scale value of the input 2 is output as an overshooting gray-scale value." The examiner interprets this to mean that the output 2 in both cases are the first and second modulated data which are used when the two values are different, being larger or smaller.).

Therefore it would have been obvious to "one of ordinary skill" in the art at the time the invention was made to combine the teachings of APA, Morita, Lee and Miyata et al. in order to create a driving method that will reduce memory and improve picture quality.

Lee also discloses a driving method including comparing n-k bits from the source data of the current frame with corresponding n-k bits from the source data of the previous frame (Paragraph [0102]. The examiner interprets that considering the bit values of the current and previous frames is the same as comparing them.).

Therefore it would have been obvious to "one of ordinary skill" in the art at the time the invention was made to combine the teachings of APA, Morita, Lee and Miyata et al. in order to enhance the response speed of the liquid crystal by modifying the liquid crystal driving method without modifying the structure of the TFT-LCD.

Regarding claim 10, APA, Morita, Lee and Miyata et al. disclose the method of claim 9. Morita also discloses wherein modulating the source data includes: modulating the source data by using the first modulated data, when the source data value of the current frame is larger than the source data value of the previous frame (Page 1, paragraph [0012]); and modulating the source data by using the second modulated data, when the source data value of the current frame is smaller than the source data value of the previous frame (Page 1, paragraph [0012]). Therefore it would have been obvious to "one of ordinary skill" in the art at the time the invention was made to combine the teachings of APA, Morita, Lee and Miyata et al. in order to create a driving method that will reduce memory and improve picture quality by allowing for an increase or decrease of the modulated data based upon an increase or decrease in the comparison between the previous frame and current frame.

Lee also discloses of modulating the n-k bit source data based on the comparison of the n-bit source data value of the current and previous frames (Paragraph [0102]. The examiner interprets that considering the current and previous 6-bit values and generating a gray signal based on this consideration would be

modulating the source data and that based on whether one was higher or lower than the other would determine the gray signal which is generated. The examiner also interprets that if the 6-bit value of the current frame is larger or smaller than the 6-bit value of the previous frame, that the original 8 bit value of the current frame would also be larger or smaller that the 6-bit value of the previous frame since the numbers are only reduced, not changed.).

Therefore it would have been obvious to "one of ordinary skill" in the art at the time the invention was made to combine the teachings of APA, Morita, Lee and Miyata et al. in order to enhance the response speed of the liquid crystal by modifying the liquid crystal driving method without modifying the structure of the TFT-LCD.

Regarding claim 18, APA discloses an apparatus for driving a liquid crystal display, comprising:

an input line for receiving n-bit source data, wherein n is a positive integer (Figure 4, Data in);

a comparator for determining whether the source data of a current frame is identical in n-k bits to the source data of a previous frame from the storage memory (Figure 4, Fn and F_{n-1} and page 5, paragraph [0010], 2nd sentence) wherein k is a positive integer less than n.

APA fails to teach of a storage memory for storing the received source data; and a modulator for registering a first modulated data that has a larger value than a data value of the current frame in accordance with an increase of the data value, and a second modulated data that has a smaller value than the data value of the current frame in accordance with a decrease of the data value, and supplying the source data of the current frame to the liquid crystal display panel, or modulating the source data by using the first and second modulated data in accordance with a judgment result of the comparator.

Morita discloses a storage memory for storing the received source data (Figure 1, item 3); and a modulator for registering a first modulated data that has a larger value than a data value of the current frame in accordance with an increase of the data value, and a second modulated data that has a smaller value than the data value of the current frame in accordance with a decrease of the data value (Figure 1, item 4 and page 2, paragraph [0012]), and supplying the source data of the current frame to the liquid crystal display panel, or modulating the source data by using the first and second modulated data in accordance with a judgment result of the comparator (Figure 1, output 2 and page 1, paragraph [0012]).

Therefore it would have been obvious to "one of ordinary skill" in the art at the time the invention was made to combine the teachings of APA and Morita in order to create a liquid crystal display driving apparatus that would not cause deterioration in picture quality but would also reduce the memory of the lookup table.

APA and Morita fail to disclose an apparatus for driving a liquid crystal display, comprising: a liquid crystal display panel comprising a plurality of data lines, and a plurality of gate lines, wherein the data lines cross the gate lines, and a liquid crystal cell is formed at a pixel area between a data line and a gate line; and wherein the comparator determines whether an n-k bit source data of a current frame is identical in n-k bits to the source data of a previous frame; and wherein the first and second modulated data are n-bit, and modulating the n-k bit source data by using the first and second n-bit modulated data.

Lee discloses an apparatus for driving a liquid crystal display, comprising: a liquid crystal display panel comprising:

a plurality of data lines (Figure 8, items D1-Dm), and

a plurality of gate lines (Figure 8, items S1-Sn), wherein the data lines cross the gate lines (Figure 8), and

a liquid crystal cell is formed at a pixel area between a data line and a gate line (Figure 8, item 100); and

wherein the comparator determines whether an n-k bit source data of a current frame is identical in n-k bits to the source data of a previous frame; and wherein the first and second modulated data are n-bit, and modulating the n-k bit source data by using the first and second n-bit modulated data (Figure 11 and paragraphs [0096]-[0102]. The examiner interprets the 6-bit gray signals to be the n-k bit source data and that since the modified gray signals are generated by considering the present and previous frames, that there would be a device such as a comparator to compare these values, and

setting modulated data to be n-bit would consist of the adding of the 2-bit data and the generated 6-bit values to make the 8-bit output value, and that the 6-bit values are modulated and that the modulation is accomplished ultimately using the 8-bit generated data.).

Therefore it would have been obvious to "one of ordinary skill" in the art at the time the invention was made to use the method taught by Lee with the method taught by the combination of APA and Morita in order to enhance the response speed of the liquid crystal by modifying the liquid crystal driving method without modifying the structure of the TFT-LCD.

Regarding claim 19, APA, Morita and Lee disclose the apparatus of claim 18. Morita also discloses wherein the comparator supplies the data of the current frame to the liquid crystal display panel when the data value is the same between the previous frame and the current frame (Page 1, paragraph [0012] where it states: "That is, the lookup table 103 is set a value, in advance, so that, when a gray-scale value of an input 1 is equal to a gray-scale of an input 2, the gray-scale value is output as an output 2..."), and supplies the source data of the current frame and the source data of the previous frame to the modulator when the data value is not the same between the previous frame and the current frame (Page 1, paragraph [0012] The examiner interprets the lookup table to be the modulator and comparator such that when the values are equal the source data is provided at output 2 but when they differ the lookup table is used to find an overshooting value).

Lee also discloses of supplying n-k bit source data of the current and previous frames to the modulator (Figure 11 and paragraph [0102]. The examiner interprets the data gray signal converter 480 to be the modulator.).

Therefore it would have been obvious to "one of ordinary skill" in the art at the time the invention was made to combine the teachings of APA, Morita and Lee in order to create a driving apparatus that will reduce memory and improve picture quality.

Regarding claim 20, APA, Morita and Lee disclose the apparatus of claim 18. Morita also discloses wherein the modulator compares n-k bits of the source data of the current frame with corresponding n-k bits of the source data of the previous frame, wherein k is a positive integer less than n, modulates the source data by using the first modulated data if the source data value is larger in the current frame than in the previous frame, and modulates the source data by using the second modulated data if the source data value is lower in the current frame than in the previous frame. (Page 1, paragraph [0012] where it states: "...however, when a gray-scale value of the input 2 is smaller than a grayscale of the input 1, an output 2 having a gray-scale value being larger than a gray-scale value of an input 2 is output as an overshooting gray-scale value and, when a gray-scale value of an input 2 is larger than a gray-scale value of an input 1, and output 2 having a gray-scale value being smaller than a gray-scale value of the input 2 is output as an overshooting gray-scale value." The examiner interprets this to mean that the output 2 in both cases are the first and second modulated data which are used when the two values are different, being larger or smaller.).

Lee also discloses of supplying n-k bit source data of the current and previous frames to the modulator (Figure 11 and paragraph [0102]. The examiner interprets the data gray signal converter 480 to be the modulator.).

Therefore it would have been obvious to "one of ordinary skill" in the art at the time the invention was made to combine the teachings of APA, Morita and Lee in order to create a driving apparatus that will reduce memory and improve picture quality.

Regarding claim 21, APA, Morita and Lee disclose the apparatus of claim 18. Lee discloses of the apparatus further comprising: a data driver for supplying the n-bit modulated data from the modulator to the data line of the liquid crystal display panel (Figure 8, item 300); a gate driver for supplying a scan signal to the gate line of the liquid crystal display panel (Figure 8, item 200); and a timing controller for controlling the data driver and the gate driver (Figure 14, item 430).

Therefore it would have been obvious to "one of ordinary skill" in the art at the time the invention was made to combine the teachings of APA, Morita and Lee in order to provide the liquid crystal display panel driving apparatus with a gate driver to control the gate lines, a data drive to control the data line and a timing controller to synchronize the display device such that the apparatus would contain the elements need to create a display.

Regarding claim 22, APA, Morita and Lee disclose the apparatus of claim 21. Lee also discloses wherein the modulator is a lookup table integrated into the timing

controller (Figure 14, item 400 is the modulator, item 462 is the lookup table and the timing controller is item 430). Therefore it would have been obvious to "one of ordinary skill" in the art at the time the invention was made to combine the teachings of APA, Morita and Lee in order to provide a modulator that had the controller and lookup table integrated together to allow for easier synchronization of the apparatus.

Regarding claim 23, APA, Morita and Lee disclose the apparatus, of claim 18. Morita also discloses wherein n is 8, and k is 1 (Page 2, paragraph [0027]. The examiner interprets this to mean that since the first input is made up of 8 bits such that n=8 and k=1.). Therefore it would have been obvious to "one of ordinary skill" in the art at the time the invention was made to combine the teachings of APA and Morita in order to provide a source data that consists of 8 bits.

Conclusion

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not

mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stephen G. Sherman whose telephone number is (571) 272-2941. The examiner can normally be reached on M-F, 8:00 a.m. - 4:30 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Edouard can be reached on (571) 272-7603. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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SS

PATRICK N. EDOUARD
SUPERVISORY PATENT EXAMINER